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DISCUSSION

THE SELECTION, INSTALLATION AND TEST OF A 1,000,000 GALLON MOTOR DRIVEN CENTRIFUGAL PUMP[1]

By S. R. Blakeman

Mr. Seabury G. Pollard: On page 562 of the June Journal there are some figures given showing a comparison of the cost of a triple expansion pump as against an electrically operated pump. The triple expansion pump referred to the speaker understands is direct acting. There is a considerable amount of formulae involved, but the net result as given shows an annual cost of $2694.25 for pumping 219,000,000 gallons with the triple expansion pump, and a cost of $1203.94 a year for pumping with an electrical pump, the price of current being taken, as stated, as 2 cents per k. w. hour. Now, an investigation of this calculation shows that of that $1203.94 the labor cost is $1000, interest and depreciation $150, and maintenance $50, $1200 in all, leaving $3.94 for cost of current for the year, which is rather a remarkable showing. Running through the figures, the speaker found that the cost of current, instead of being $3.94, would be $3940; making the total cost for operating the electrical plant $5140, instead of $1203.94, about double the cost of operating the reciprocating pump. The reason for calling attention to this is only because this paper gives out the impression that pumping by electrical current at 2 cents per k. w. hour is more economical than pumping by steam. That is not the case. The cost is just about double, in this particular instance.

Mr. S. R. Blakeman: The author's computer made an error; the cost of current should be 56 mills, based on coal only. With the motor driven pump C should equal $2313 and the saving over steam pump equal $301.25.

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[1] **Published in the June, 1916, Journal, vol. 3, No. 2, at pp. 557–580.**

Mr. D. A. Reed: The City of Duluth was operating in 1908 two 5,000,000 gallon triple expansion condensing engines. In that year there was installed in the same pumping station a 12,000,000 gallon 2-stage electrically operated centrifugal pump. A comparison was made that year with the steam pumps that had been operated in previous years; and the details of that cost are reported in the 1909 report. A copy of that report can be obtained by writing to the Water and Light Department of Duluth. The speaker is sorry that he cannot give the figures in detail; but the total cost for the entire year under the operation of the electric pump was slightly under that of the steam pumps. The cost for electric power was about 0.4 per k. w. hour; and in comparison of costs of course the cost of the investment was included, and interest and depreciation on both plants. There is not much of a saving in the use of an electric pump; but there is a large saving in the amount of space required for that pump, which is not taken into account in the comparison. It also gives a little better factor of safety. If you are going to have insurance against interruption of steam pump service it is better to install an electrical pump than a duplicate steam pump. Sometimes there is difficulty in getting coal supplies, and considerable trouble was experienced from the boiler and the breakage of engine parts.

Mr. S. G. Pollard: How can a safer service be obtained electrically than with a steam plant? With electric power you are dependent upon the output of some other company rather than upon your own power plant. When the possibility of trouble with that plant and the chances taken with the overhead wiring are considered, especially if the fire hazard of the community is taken into account, it would appear much safer to depend upon the isolated steam driven pumping plant. Unless power is furnished from two different sources and over two lines of wire well separated, it would not be particularly safe, from a fire protection standpoint, to run a water works that way. There are of course individual cases in which it might be desirable. As to the cost of operating a plant electrically as compared with steam, the speaker has made a number of such comparisons and has usually found that electric current should be obtained at from five to seven mills per kilowatt hour to compete.

President Hill: The speaker's experience in that regard has been identical with that of Mr. Pollard. He has never been able to figure that electrical pumping is as cheap as steam pumping, unless the current can be brought down to a price around 0.6 cent, the exact figure depending upon the efficiency of the steam pumps. He has encountered the electrical pumping proposition on a number of occasions, owing to the activity of the commercial agents of the electrical companies trying to convince clients that an electrically driven pump was the thing to adopt. The occasions where an electrical pump may be introduced for economy's sake are very rare, indeed, except in very small installations.

Mr. D. A. Reed: At times there is difficulty in getting a coal supply at Duluth. Some interruption of service was experienced from weak parts in the engines, which must of necessity be somewhat complicated and more liable to breakage than a centrifugal pump. The electrical service has been excellent during the seven or eight years that it has been in operation; there have been only a few instances where the current was off for an hour or two at a time. The current is furnished by a large hydro-electric plant, which gives very excellent service. We find one advantage, that when the reservoir is shut off for repairs we can give direct pressure with the centrifugal pump much better and safer than we could with a steam pump.